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EXAMINER	
HECK, MICHAEL C	

ART UNIT	PAPER NUMBER
3623	

DATE MAILED: 10/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/740,091	COHEN ET AL.	
	Examiner	Art Unit	
	Michael C. Heck	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-17 and 19-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-17 and 19-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Final Office Action is responsive to applicant's amendment filed 18 July 2005. Applicant canceled claims 2 and 18 and amended claims 1, 3-9, 17, 22-23 and 32. Currently, claims 1, 3-17 and 19-32 are pending.

Response to Arguments

2. Applicant's arguments with respect to claims 1-32 have been considered but are moot in view of the new ground(s) of rejection. Applicant amended claim 1 to indicate the objective function is solved for resource allocation related to the purchase of a second set of items using linear programming optimization. Applicant asserts Data Mining News (Data Mining News, Looking Past Automation, MarketSwitch Focuses on Optimization of Marketing Campaigns, Data Mining News, 10 May 1999 [GOOGLE]) teaches away from the claimed invention since Data Mining News teaches non-linear programming to calculate the optimal solicitation matrix. However a new ground(s) of rejection is made in view of Saarenvirta (Saarenvirta, Data Mining to Improve Profitability, CMA Magazine, Vol. 72, No. 2, March 1998, p. 8-12 [DIALOG: file 15]) and Johnson et al. (Johnson et al., Recent Developments and Future Directions in Mathematical Programming, IBM Systems Journal, Vol. 31, No. 1, 1992, p.79-93 [DIALOG: file 15]). The Examiner notes that the old reference, Data Mining News teaches reducing the original linear multidimensional problem to the non-linear problem, that is, linear programming was the original solution that was improved upon by

MarketSwitch. Saarenvirta and Johnson et al. teach linear programming. Please see the 35 U.S.C. Rejection below.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1, 14-17 and 29-31** are rejected under 35 U.S.C. 103(a) as being unpatentable over Saarenvirta (Saarenvirta, Data Mining to Improve Profitability, CMA Magazine, Vol. 72, No. 2, March 1998, p. 8-12 [DIALOG: file 15]) in view of Johnson et al. (Johnson et al., Recent Developments and Future Directions in Mathematical Programming, IBM Systems Journal, Vol. 31, No. 1, 1992, p.79-93 [DIALOG: file 15]).

Saarenvirta discloses a cross-selling optimizer comprising:

- **[Claim 1]** using a computer to retrieve cross-selling relationships that associate purchases of a first set of items with purchases of a second set of items (Para 1, 4, 18, 19 and 21, Saarenvirta teaches data mining tools, software vendors, an affinity analysis for the identification of previously known and unknown patterns, i.e., product combinations, and cross-selling new products as a marketing initiative of choice. Inherently, a computer is used since software is used.).

- said cross-selling relationships being associated with a cross-selling statistic, wherein the cross-selling statistic is indicative of potential for the purchase of the second set of items based upon the purchase of the first set of items (Para 18 and 19, Saarenvirta teaches an affinity analysis for the identification of previously known and unknown patterns, i.e., product combinations, where the algorithms include an association rule generator.).

- using a computer to determine a cross-selling opportunities metric that solves the business issue (Para 1, 4, 18, 21 and 23-24, Saarenvirta teaches data mining tools, software vendors, an affinity analysis for the identification of previously known and unknown patterns, i.e., product combinations, and cross-selling new products as a marketing initiative of choice. An affinity analysis discovers that the high profit group has a distinct product pattern: mortgages, mutual funds and credit cards. The lower profit group reveals they have product patterns that partially fill the high profit group pattern: mutual funds and credit cards. The marketing campaign would thus be to market mortgages to the low profit segment. A predictive model is used to target those customers. Inherently, a computer is used since software is used.),

Saarenvirta fails to teach wherein the cross-selling opportunities metric is determined for at least one cross-selling relationship by at least substantially optimizing an objective function with respect to constraints and to the cross-selling statistic, wherein at least one of the constraints is based upon the business issue, and wherein the objective function is solved for resource allocation related to the purchase of the second set of items using linear programming optimization. Saarenvirta does teach employing an affinity analysis for the identification of previously known and unknown patterns, i.e., product combinations by using algorithms to include an association rule generator. An affinity analysis discovers that the high profit group has a distinct product pattern: mortgages, mutual funds and credit cards. The lower profit group reveals they have product patterns that partially fill the high profit group pattern: mutual funds and credit cards. The marketing campaign would thus be to market mortgages to the low profit segment. A predictive model is used to target those customers. Algorithms for predictive modeling include linear regression (Para 14, 18-19 and 23-24). Johnson et al. teach mathematical programming refers to mathematical optimization concerned with optimizing some objective function subject to constraints (maximizing profits or

minimizing cost). A mathematical programming problem is a linear program (LP) when the objective function is linear and the only constraints are linear equations and inequalities (Para 3). It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify Saarenvirta with the mathematical optimization of Johnson et al. since Saarenvirta teaches using a predictive model to target customers (Para 24). Data mining helps companies use data already known to improve strategic and tactical decisions. Saarenvirta teaches one process that companies can use to transform their operational data into actionable decision-support information is data mining. This process, using advanced artificial intelligence and machine-learning tools, can increase corporate profitability, through either cost reduction or revenue increases. Enabling all business analysts within companies to use data mining in their day-to-day activities will allow organizations to maximize the benefit of data mining (Para 3 and 38). Johnson et al. teach linear programming was developed and has grown in parallel with computers to include application areas such as transportation, distribution, manufacturing, scheduling, and finance. The finance area is one where there are great advantages of using optimization software, and as faster, easier-to-use software becomes available, the usage could increase dramatically (Para 2 and 11). Using mathematical programming helps companies use data already known to optimize a business solution, therefore improving a company's strategic and tactical decisions making process. Both Saarenvirta and Johnson et al. teach linear regression, therefore there is a motivation or suggestion to combine. Johnson et al. further describes the mathematical process of using a linear regression, therefore there

is a reasonable expectation of success. Combined, Saarenvirta and Johnson et al. teach all the claim limitations as described above.

- **[Claim 14]** the first and second set of items includes products to be purchased by customers (Saarenvirta: Para 18, Saarenvirta teaches product combinations (e.g., soda pop and chips, or beer and diapers).

- **[Claim 15]** the first and second set of items includes services to be purchased by customers (Saarenvirta: Para 18, Saarenvirta teaches sequences of purchases (e.g., chequing account followed by a credit card and followed by a mortgage). The Examiner interprets the purchases to be services.).

- **[Claim 16]** the cross-selling relationships and cross-selling statistic are generated from a data miner based upon historical data on sales related to the first and second sets of items (Saarenvirta: Para 1 and 13, Saarenvirta teaches data mining tools like IBM's Intelligent Miner or SAS Statistical Package. Predictive modeling involves using historical customer purchase and/or promotional data to forecast future customer purchases, promotional responses, customer profitability, customer risk, etc.).

Claims 17 and 29-31 substantially recite the same limitations as that of claims 1 and 14-16 with the distinction of the recited method being a system. Hence the same rejection for claims 1 and 14-16 as applied above applies to claims 17 and 29-31.

5. **Claims 10-13, 25-28 and 32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Saarenvirta (Saarenvirta, Data Mining to Improve Profitability, CMA Magazine, Vol. 72, No. 2, March 1998, p. 8-12 [DIALOG: file 15]) in view of Johnson et al. (Johnson et al., Recent Developments and Future Directions in Mathematical Programming, IBM Systems Journal, Vol. 31, No. 1, 1992, p.79-93 [DIALOG: file 15]) and further in view of Tate et al. (U.S. Patent 6,611,829). As to claim 10, Saarenvirta and Johnson et al. discloses a cross-selling optimizer but fail to teach the cross-selling

relationships include association rules, wherein the association rules have left-hand-side items and right-hand-side items. Saarenvirta does teach data mining methodologies and algorithms to include predictive modeling and affinity analysis where the algorithms for predictive modeling include linear regression and where the affinity analysis includes association rule generators. Affinity analysis is the identification of previously known and unknown patterns that exist in sets of items. The sets of items typically include market baskets, accounts, customers, households, etc. The discovered patterns include pattern combinations, sequences of purchases and similar time series. Some business opportunities for data mining include a cross-sell analysis (Para 12, 14, 18-19 and 26). Tate et al. teach the analytic algorithm for association measures one or more associations between a plurality of items in a stream of transaction data. Associations are relationships between one or more items in a transaction or "item group", sometimes called the "antecedent" or "left-hand-side", and one or more different items in the same item group, sometimes called the "consequent" or "right-hand-side" (col. 8, lines 45-54). It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify Saarenvirta and Johnson et al. with the association rule relationships of Tate et al. since Saarenvirta teaches association rule generators (Para 19). Data mining helps companies efficiently use data already known to improve strategic and tactical decisions. Saarenvirta teaches one process that companies can use to transform their operational data into actionable decision-support information is data mining. This process, using advanced artificial intelligence and machine-learning tools, can increase corporate profitability, through

either cost reduction or revenue increases. Enabling all business analysts within companies to use data mining in their day-to-day activities will allow organizations to maximize the benefit of data mining (Para 3 and 38). Tate et al. teach performing data mining applications in a relational database management system where the object is to provide a more efficient usage of parallel processor computer systems (col. 3, lines 10-15). Using mathematical programming helps companies use data already known to optimize a business solution, therefore improving a company's strategic and tactical decisions making process. Saarenvirta and Tate teach association rules, therefore there is a motivation or suggestion to combine. Tate et al. further defines association, therefore there is a reasonable expectation of success. Combined, Saarenvirta and Johnson et al. and Tate et al. teach all of the claim limitations as described above.

- **[Claim 11]** the cross-selling statistic is a lift cross-selling statistic (Tate et al.: col. 8, line 45 to col. 9, line 7, Tate et al. teach three measures are provided for each discovered association to include lift.).

- **[Claim 12]** the lift cross-selling statistic is ratio of the probability of having the right-hand-side items given that a customer has the left-hand-side items, over the probability that the customer has the right-hand-side items (Tate et al.: col. 8, line 45 to col. 9, line 7, Tate et al. teach lift is a measure of how much the likelihood of an item (B) occurring in an item group is increased by the presence of a different item (A) in the item group. It is calculated by dividing the confidence of A->B by the support of B. Confidence is the likelihood of an item (A) occurring in an item group given that different item (B) is in the item group and support is the percentage of item groups that contain an items or set of items.).

- **[Claim 13]** the cross-selling statistic further includes an expected confidence cross-selling statistic that indicates the frequency with which the right-hand-side items occurs in the overall population of the first and second set of items (Tate et al.: col. 8, line 45 to col. 9, line 7, Tate et al. teach confidence is the likelihood of an item (A) occurring in an item group given that different item (B) is in the item group.).

- **[Claim 32]** computer data storage means for storing association rules that associate purchases of a first set of items with purchases of a second set of items (Tate et al.: col. 4, line 30 to col. 5, line 6 and col. 8, line 45 to col. 9, line 7, Tate et al. teach a computer hardware environment comprising one or more processors or nodes interconnected by a network. Each of the nodes is comprised of one or more processors, random access memory, read-only memory, and other components to include one or more fixed and/or removable data storage units. Each one of the nodes executes one or more computer programs, such as a Data Mining Application. The Analytic Algorithm for association measures one or more associations between a plurality of items in a stream of transaction data. Saarenvirta: Para 1 and 13, Saarenvirta teaches data mining tools like IBM's Intelligent Miner or SAS Statistical Package. Predictive modeling involves using historical customer purchase and/or promotional data to forecast future customer purchases, promotional responses, customer profitability, customer risk, etc.). ;

- said association rules being associated with a lift cross-selling statistic, said lift cross-selling statistic being indicative of potential for the purchase of the second set of items based upon the purchase of the first set of items (Tate et al.: col. 8, line 45 to col. 9, line 7, Tate et al. teach lift is a measure of how much the likelihood of an item (B) occurring in an item group is increased by the presence of a different item (A) in the item group. It is calculated by dividing the confidence of A->B by the support of B. Confidence is the likelihood of an item (A) occurring in an item group given that different item (B) is in the item group and support is the percentage of item groups that contain an items or set of items.);

- constraints storage means for storing constraints related to achieving a predetermined business goal (Tate et al.: col. 4, line 30 to col. 5, line 6 and col. 8, line 45 to col. 9, line 7, Tate et al. teach a computer hardware environment comprising one or more processors or nodes interconnected by a network. Each of the nodes is comprised of one or more processors, random access memory, read-only memory, and other components to include one or more fixed and/or removable data storage units. Each one of the nodes executes one or more computer programs, such as a Data Mining Application. Johnson et al.: Para 3, Johnson et al. teach mathematical programming refers to mathematical optimization concerned with optimizing some objective function subject to constraints (maximizing profits or minimizing cost). A mathematical programming problem is a linear program (LP) when the objective function is linear and the only constraints are linear equations and inequalities.).; and

- optimization means connected to the computer data storage and to the constraints storage means, said optimization means containing an objective

function that determines the amount of effort to be used in the selling of the items by substantially maximizing the predetermined business goal subject to the constraints, the association rules, and the lift cross-selling statistic; wherein the objective function is solved for resource allocation related to the purchase of the second set of items using linear programming optimization (Johnson et al.: Para 3, Johnson et al. teach mathematical programming refers to mathematical optimization concerned with optimizing some objective function subject to constraints (maximizing profits or minimizing cost). A mathematical programming problem is a linear program (LP) when the objective function is linear and the only constraints are linear equations and inequalities. Tate et al.: col. 8, line 45 to col. 9, line 7, Tate et al. teach three measures are provided for each discovered association to include support, confidence and lift. Saarenvirta: Para 1 and 13, Saarenvirta teaches data mining tools like IBM's Intelligent Miner or SAS Statistical Package. Predictive modeling involves using historical customer purchase and/or promotional data to forecast future customer purchases, promotional responses, customer profitability, customer risk, etc.).

Claims 25-28 substantially recite the same limitations as that of claims 10-13 with the distinction of the recited method being a system. Hence the same rejection for claims 10-13 as applied above applies to claims 25-28.

6. **Claims 3-9 and 19-24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Saarenvirta (Saarenvirta, Data Mining to Improve Profitability, CMA Magazine, Vol. 72, No. 2, March 1998, p. 8-12 [DIALOG: file 15]) in view of Johnson et al. (Johnson et al., Recent Developments and Future Directions in Mathematical Programming, IBM Systems Journal, Vol. 31, No. 1, 1992, p.79-93 [DIALOG: file 15]) further in view of Balintfy et al. (Balintfy et al., Binary and Chain Comparisons with an Experimental Linear Programming Food Price Index, The Review of Economics and Statistics, Vol. 52, No. 3, August 1970, pp. 324-330 [JSTOR]). As to Claim 3, Saarenvirta and Johnson et al. disclose a cross-selling optimizer but fail to teach the

objective function is solved for personnel effort resource allocation related to the purchase of the second set of items using linear programming optimization. Balintfy et al. teach given the prices of all foods contained in the menu items in the model, linear programming is then employed to find the set of menu items which minimizes the cost of meals per person-day over the 31 day planning cycle, subject to meeting the constraints described (Para 21). It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include the linear programming approach of Balintfy et al. with the teachings of Saarenvirta and Johnson et al. since Saarenvirta teach that it is old and well known in Business to use data mining to increase corporate profitability, through either cost reduction or revenue increases (Para 3). Companies expect to maximize ROI (Return on Investment) in order to stay in business. The most important part of the data mining process is the business results analysis. A good application will allow the measurement of the return on investment (ROI) that will conclusively show the benefits of data mining (Saarenvirta: Para 11). Balintfy et al. teach one obtains the combination, which satisfies the same constraints as before and minimizes the total cost at the prices of the given period (Balintfy et al.: Para 9). Therefore, measuring of the return on investment (ROI) and minimizing cost both relate to maximizing the ROI.

- **[Claim 4]** one of the constraints is based upon target effort for an item (Balintfy et al.: Para 16, Balintfy et al. teach an "Upper Bounds" constraint, which is the maximum number of times in a 31-day period that a given dish or menu item may be served.).

- **[Claim 5]** one of the constraints is directed to size of markets involving the first and second sets of items (Balintfy et al.: Para 18, Balintfy et al. teach a structural constraint. The model utilizes the concept of three meals per day,

31 complete breakfasts, 62 complete dinner or supper meals for a 31-day menu- planning cycle.).

- **[Claim 6]** one of the constraints is directed to size of markets involving the first and second sets of items such that resource allocation is biased towards markets that are larger than other markets (Balintfy et al.: Para 15, 16 and 18, Balintfy et al. teach the objective was to determine, at prevailing prices, the least cost combination of meals per person-day for a 31-day planning cycle period, satisfying given structural, nutritional, palatability, and variety constraints. The upper bounds constraint is the maximum number of times in a 31-day period that a given dish or menu item may be served. The structural constraint utilizes the concept of three meals per day, 31 complete breakfasts, 62 complete dinner or supper meals for a 31-day menu- planning cycle.).

- **[Claim 7]** one of the constraints constrains the objective function to generate resource allocations that are substantially equal for all items whose resource allocations are determined by the optimization function to be greater than zero (Balintfy et al.: Para 17, Balintfy et al. teach nutrient constraint, in which five nutrient constraints are imposed (calories, proteins, iron, thiamin, niacin), reflecting institutional policy.).

- **[Claim 8]** one of the constraints constrains the objective function to maximize the return on equity (Balintfy et al.: Para 15, Balintfy et al. teach the objective was to determine, at prevailing prices, the least cost combination of meals per person-day for a 31-day planning cycle period, satisfying given structural, nutritional, palatability, and variety constraints. The Examiner interprets minimizing cost is a method of maximizing the return on equity.).

- **[Claim 9]** the cross-selling opportunities metric includes an effort cross-selling opportunities metric which solves the business issue, wherein the business issue is directed to the resource allocation that maximizes return on investment related to the purchasing of the second set of items (Balintfy et al.: Para 15, Balintfy et al. teach the objective was to determine, at prevailing prices, the least cost combination of meals per person-day for a 31-day planning cycle period, satisfying given structural, nutritional, palatability, and variety constraints.).

Claims 19-24 substantially recite the same limitations as that of claims 3-9 with the distinction of the recited method being a system. Hence the same rejection for claims 3-9 as applied above applies to claims 19-24.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Michael C. Heck whose telephone number is (571) 272-6730. The Examiner can normally be reached Monday thru Friday between the hours of 8:30am - 4:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq R. Hafiz can be reached on (571) 273-6729.

Any response to this action should be mailed to:

Director of the United States Patent and Trademark Office
P.O. Box 1450
Alexandria, Virginia 22313-1450

Or faxed to:

(571) 273-8300	[Official communications; including After Final communications labeled "**Box AF**"]
(571) 273-6730	[Informal/Draft communication, labeled "**PROPOSED**" or "**DRAFT**"]

MCH
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3 October 2005

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SUPERVISORY PATENT EXAMINER
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